

GEOGRAPHIC VARIATIONS IN INDIANA IN TYPHOID, TUBERCULOSIS, CANCER AND IN TOTAL DEATHS.

STEPHEN SARGENT VISHER, Indiana University.

For some time the writer has been interested in the geography of Indiana, and in the contrasts among the different parts of the state. In the *Proceedings* for 1922, may be found a paper dealing with some contrasts, and in a book recently published, more than a hundred maps are given showing the contrasts in the production of crops, in the climate, mineral resources, etc.

The contrasts among the counties in the death rates given by the State Board of Health each year in the Yearbook of Indiana afford additional illustrations that there is considerable diversity in even so small and homogeneous a state as Indiana.

As the rates are small in proportion to the population, and as epidemics and differences in the weather cause irregularities from year to year, the following maps are based on the average death rates for four or five years.

The four special maps, figures 1, 5, 9 and 11, reveal conspicuous contrasts among Indiana counties in death rates from typhoid, tuberculosis, cancer and from all causes. These contrasts may be explained in part by differences in geographic environment. Conditions that appear to help explain the differences in death rates are shown in the other maps of this paper. Figures 3 and 6 (as well as 1, 5, 9 and 11) have not been published before. The other five maps are from *The Economic Geography of Indiana*, Appletons, New York, 1923.

Typhoid Fever.—Indiana has a rather bad record for typhoid, having an average mortality of 12.8, which is 25 per cent higher than the average for the registration area of the United States. Furthermore the rate has fallen less in Indiana in recent years than it has in the nation as a whole. Figure 1 shows that several counties, those in black, have on the average, five times the death rate as do other counties, those in white. In the crossed counties, there is three times the typhoid risk present in the white counties.

According to these data, Lake County with its extensive marshy tracts and largely emigrant population, has the greatest average mortality from typhoid, an average of 35 deaths per year per 100,000 population. Four counties in the limestone area, shown in figure 2, have rates between 25 and 27.5. The other counties in this limestone region also suffer heavily, the disease apparently being comparatively easily spread through the agency of the poorly filtered ground water. It will be recalled that in limestone regions, water commonly enters the ground through sink holes and moves quickly along crevices, emerging perhaps miles distant, but not purified by filtration nor by spending a long period beneath the ground.

Other counties having a high death rate from typhoid are those in the coal mining region (figure 3) where many miners live without proper sanitary arrangements and without safe water supplies.

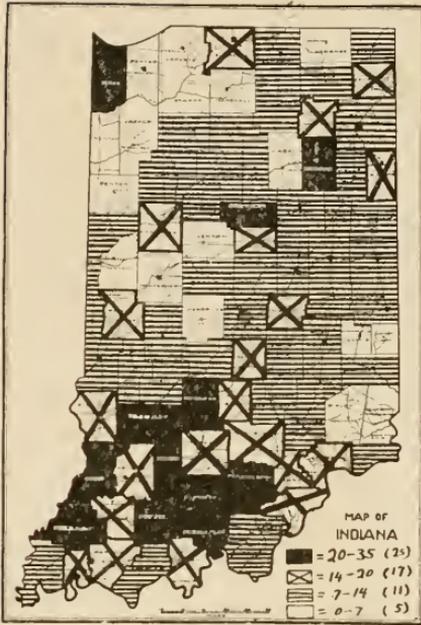


Fig. 1. Death rate from typhoid, the average of the four years 1917-1920. Data from State Board of Health reports.

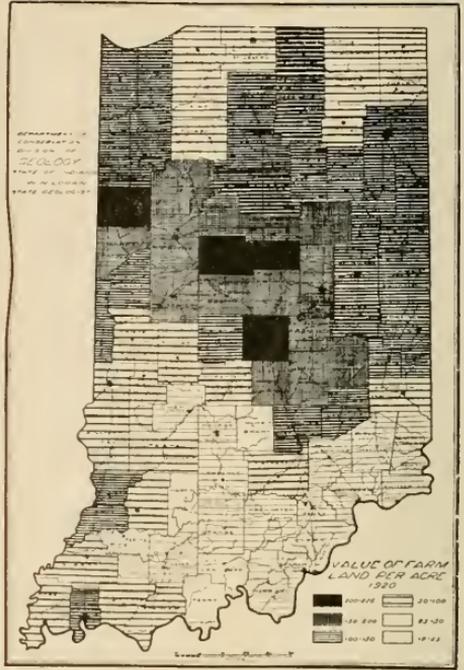


Fig. 4. Value of farm land per acre, according to counties.



Fig. 2. Section shaded indicating the area where limestone outcrops extensively and where the water supplies come from limestone.



Fig. 3. Section shaded to indicate the important coal mining area.

Some of the other counties with high death rates for typhoid are those in which the land is mostly rugged, the soil poor, and the people poverty-stricken. Figures 4, 7 and 8 illustrate the contrasts among the counties in respect to value of farm land, in per cent of waste land, and in the taxables per average square mile. Comparison of these three maps with figure 1 reveals several correspondences, many of the poorer counties having abnormally high death rates, while several of the richer counties are white on figure 1.

The unsatisfactory sanitary conditions characteristic of camp life on the shores of some of the lakes of the northeastern part of the state

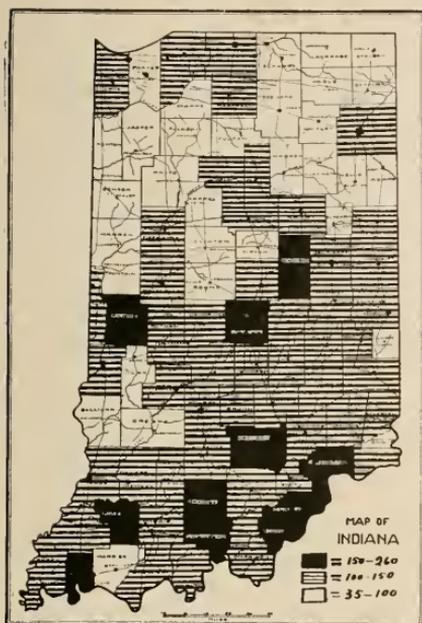


Fig. 5. Death rate from all forms of tuberculosis. Average of the five-year period, 1917-21.

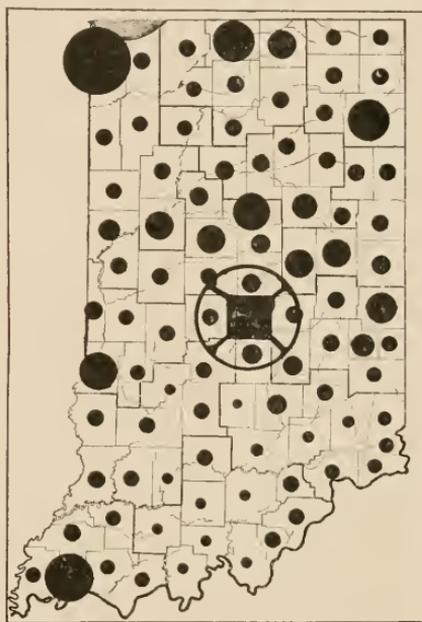


Fig. 7. Variation in taxable property per square mile in 1921. Values are proportional to the size of the circles, from less than \$15,000 to \$800,000 per square mile, by counties.

may help explain the rather high rates in some of the northeastern counties.

None of the counties having large cities are black in figure 1, except Lake County, with Gary. The larger cities of Indiana have provided a reasonably safe water supply, which is by no means true of many of the smaller towns and villages.

Tuberculosis.—The death rate from all forms of tuberculosis is nearly ten times as great in Indiana on the average as is the death rate from typhoid. The rate in Indiana moreover is about 25 per cent less than the average rate for the registration area of the United States. Figure 5, which is based on the average of the five years, 1917-1921, shows that there is less average contrast among the counties in deaths

from tuberculosis than in deaths from typhoid. Nevertheless the black counties of figure 5 have over three times the mortality in proportion to population as have the white counties. The two highest counties (Jefferson 261, Parke 246) have 5.7 times the average rate of two other counties (Benton 35.4, Lagrange 54).

Tuberculosis is spread by direct contact, and reflects low resistance, ignorance and lack of proper food and health habits. Figure 5 reveals a conspicuous contrast between the southeastern half of the state and the northwestern half. An adequate explanation of this contrast is not available, but figures 6, 7, 8 and 10 are interesting in this connection. Figure 6 shows the four counties having most negroes, and



Fig. 6. The negro population of four counties exceeds six per cent (Floyd 6, Vanderburgh 7, Marion 9, Clark 9).

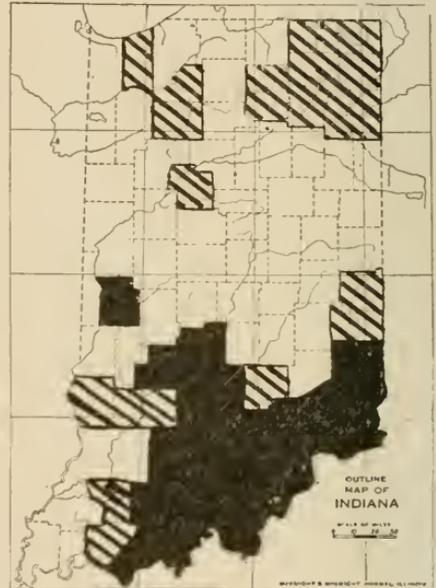


Fig. 8. Relative areas of waste land according to counties, as reported by the county assessors. Crossed counties 1/8 to 1/12 waste, white counties less, black counties more.

are the only counties in which the negroes make up as many as three per cent of the population, excepting Lake County which had 4.5 per cent in 1920. Each of these counties has a high death rate, partly because negroes suffer severely from tuberculosis. Figures 7 and 8 reflect contrasts in poverty, poor diet and low resistance. Figure 10, showing the change in population in the thirty years, 1890 to 1920, shows some similarity to figure 5. The counties that have lost population or stood still are largely in the southern section of the state, where tuberculosis is reported as especially prevalent. None of the large cities however have a low death rate from tuberculosis, perhaps because of their large negro populations, their congestion, their dust and their soot, for all of these increase the death rate from tuberculosis.

Certain special conditions doubtless help explain the peculiarities of figure 5. For example, Parke County is black partly because of its large tuberculosis hospital, in which many patients from other counties and states die. Another special condition has been suggested, namely that the doctors in the poorer counties of the southern part of the state are older on the average than those in the more industrial and richer central and northern counties, and are therefore more likely, physicians say, to report deaths from ill-defined causes as due to tuberculosis than the younger doctors.

It may be that figure 5 is partly explained by the fact that the southeastern half of the state is largely peopled by the descendants of



Fig. 9. Death rate from cancer per 100,000 population, for the years 1917-20. Data from the reports of the State Board of Health.

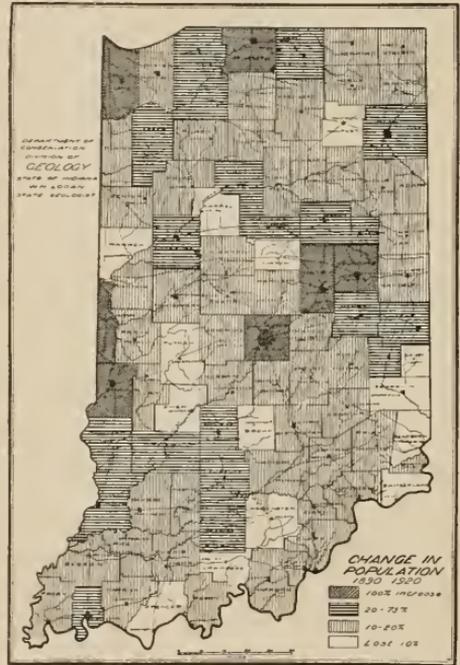


Fig. 10. Changes in population between the census of 1890 and 1920.

persons who came from Kentucky, Virginia, Carolina and Pennsylvania while the remainder of the state was originally largely settled by persons from New York, Ohio, New England and by recent immigrants from northwestern Europe. In the former case, the settlers moved into a somewhat more severe climate, while in the latter case they moved into a milder climate, with more sunshine, and where better dietary conditions prevailed.

Cancer.—The cancer map (figure 9) shows less regional contrast than prevails in typhoid or tuberculosis, the white counties having an average mortality of 65 and the black 120. Geographic influences are not clearly shown on this map, and some of its features are hard to

explain, for example, the fact that the mortality from cancer is relatively low in all of the southwestern part of the state. Most of the black counties, except in the south, contain considerable industrial populations (see figure 12). Some think that the exciting lives and rich diets in our busy cities tend to increase cancer. The high mortality in some of the southern counties may be due to the fact that most of the young people have left, leaving the older folks, the danger from cancer increasing with age. Figure 10, showing the change in population between 1890 and 1920, is interesting in this connection. Comparisons of figures 9 and 10 show, for example, that several of the counties which have increased most rapidly in population have a low cancer rate,

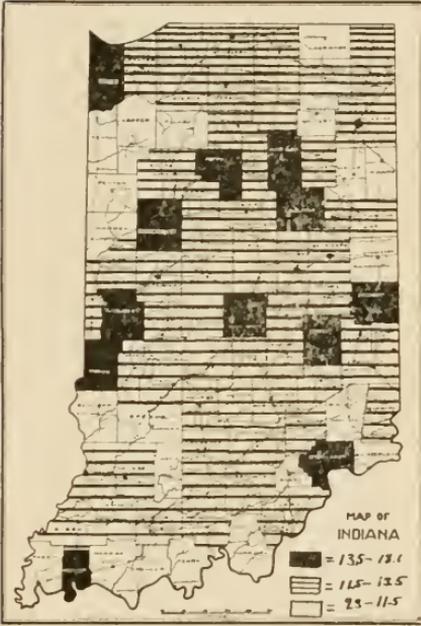


Fig. 11. Average death rate per 1,000 persons in the five-year period 1917-21, according to reports of the State Board of Health.

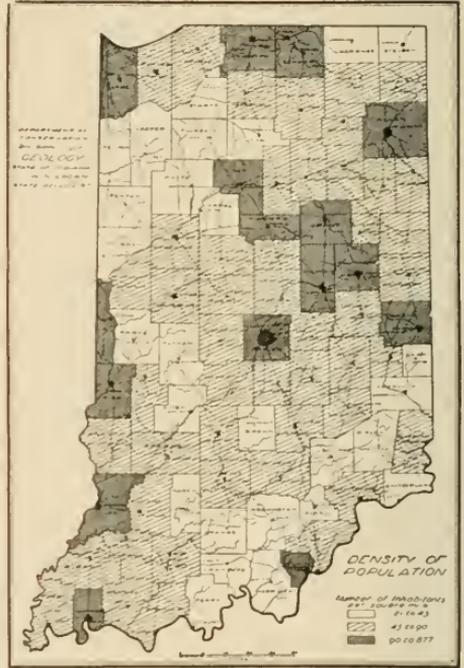


Fig. 12. Density of population in 1920, by counties.

presumably partly because few of their people have reached the age when cancer is especially prevalent. The low death rate from cancer in the coal mining counties of the southwestern part of the state may be partly explained by the demand there for workers in their prime. Other white counties in the southern part of the state may have a low reported death rate from cancer because the cause of the death of many of the poorer residents of the rougher counties may not be accurately diagnosed.

General Death Rate.—Figure 11 shows the average death rate from all causes for the five years, 1917-1921. It shows the least contrast of this series of death rate maps. The black counties have an average

rate of only about 50 per cent more deaths than the white counties. However, Jefferson County has over twice the rate of Benton and Adams counties.

The larger cities make themselves evident on this map, most of them causing their counties to be blackened. The average death rate from all causes, including accidents, in Indianapolis is more than 50 per cent more than the average for the state. Part of this, however, is due to the fact that many residents of the country and small villages die in city hospitals. Yet they are reported for the city in which they die. This defect in our law helps explain why Parke County, with its large tuberculosis hospital and several other counties with large hospitals have an abnormally high death rate.

The low death rate from some of the poorest counties in the state may be partly due to the fact that they have lost many of their young married people, those having children. The death rate among infants is of course far higher than is the rate among adults. The decrease in child bearing in rural districts, in spite of occasional large families, is indicated by statistics given in the Yearbook for 1922, which reveal that both the death rate and the birth rate in rural districts is lower than in cities. But the ratio of births to deaths is about the same, about twice as many births as deaths.

Comparison of figure 11 with the other maps may be made with interest. For example, figures 10 and 11 show that of the 21 white counties of figure 11, six lost population between 1890 and 1920, 12 remained about stationary and only 3 made appreciable gains. Most of the counties that doubled in population between 1890 and 1920 have high death rates.

Many other comparisons might be drawn, but space and time prohibit. It is hoped, however, that this study of the distribution of diseases and deaths in Indiana will be carried further, with advantage to those who follow us.

